

ABSTRACT OF THE DISCLOSURE

[0066] Apparatus and methods for measuring retardance and slow axis azimuth in sample specimens. The invention can be used in imaging systems that obtain retardance and slow axis azimuth orientation at all points in a two-dimensional image simultaneously. A sample is illuminated by circularly polarized monochromatic light which is then analyzed by an elliptical analyzer at different settings. In another embodiment, light conditioned by an elliptical polarizer at various settings illuminates a specimen and the beam exiting the sample is analyzed by a circular analyzer. The elliptical analyzer/polarizer may have selectable ellipticity and azimuth angle, including in some cases a setting of circular polarization. Background images obtained with selected settings of the elliptical analyzer/polarizer, but without the sample present, are used in some embodiments to improve the measurement. Algorithms are described which employ two specimen images with elliptical settings and three or two background images; or which employ three specimen images with elliptical settings; or which employ four specimen images with elliptical settings without an extinction setting; or which employ five specimen images with four elliptical settings and one extinction setting. These algorithms allow one to variously optimize measurements for speed, sensitivity, and accuracy.